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Restoring the Salton Sea

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The Salton Sea is a large inland lake in southeastern California. In the coming decades, the Sea will begin to dry up—impairing air quality, reducing the availability of wildlife habitat, and increasing the salinity of the remaining Sea. The State of California has legal and contractual obligations to restore the Sea, and the Secretary for Resources has recommended an $8.9 billion restoration plan to the Legislature.

In this report, we discuss the history and current state of the Sea and the legal and policy reasons for restoring the Sea. We then recommend a number of steps the Legislature should take in considering how to proceed with the restoration. We believe these steps will enable the Legislature to make informed decisions regarding the Sea within the state's funding constraints. ■

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EXECUTIVE SUMMARY

The Issue. The Salton Sea (the Sea) is a large inland lake in southeastern California. In the coming decades, a transfer of Colorado River water from Imperial Valley to San Diego County will reduce the amount of agricultural runoff that currently flows into the Sea. Primarily due to this change in water use, the Sea will begin to dry up—impairing air quality, reducing the availability of wildlife habitat, and increasing the salinity of the remaining Sea, thereby killing off most aquatic life in the Sea. Due to a series of statutes and contractual agreements regarding the use of Colorado River water in Southern California, the state has an obligation to restore the Sea. After considering several alternative restoration plans, the Secretary for Resources has recommended an $8.9 billion plan to restore the Sea. It is now up to the Legislature, working with the administration, to decide whether to proceed with the Secretary's recommended alternative, modify it, or select a different approach.

Scope of Report. In this report, we discuss the history and current state of the Sea, the legal and policy reasons for restoring the Sea, the planning process that produced the proposed restoration plan, and the restoration alternatives that were considered, including the "Preferred Alternative" selected by the Secretary.

We do not recommend for or against the Secretary's preferred restoration alternative—or any of the potential restoration plans. Assessing the technical differences between the various alternatives is beyond the scope of this report. Rather, we recommend a number of steps for the Legislature to take—including policy and fiscal issues to consider—prior to adopting a restoration plan. We believe these steps provide a framework that will allow the Legislature to make an informed decision about how to address issues surrounding the Sea within the state's funding constraints.

Recommendation. First, we recommend the Legislature set explicit policy priorities in statute for addressing environmental problems at the Sea. Specifically, we recommend the Legislature establish the protection of air quality and the preservation of wildlife habitat as the highest priorities for expenditure.

Second, we recommend the Legislature adopt a comprehensive plan at the outset of the restoration process. The restoration plan should reflect the Legislature's funding priorities and be accompanied by a long-term financing plan that realistically considers who will pay for the restoration. For reasons that we discuss in detail in the report, we believe that the state's General Fund will be called upon to pay for the vast majority of the costs of any restoration plan, as it is unlikely the federal government or local beneficiaries will provide significant funding. The restoration plan should also designate the appropriate governance structure for the restoration. We recommend the Legislature designate the Department of Water Resources (DWR) as the primary implementing agency for this purpose.

Finally, we recommend the Legislature consider funding interim measures to address priority issues in the near term. Until the Legislature is ready to proceed with a full-scale restoration plan, there are opportunities to adopt interim measures to address priority issues—such as air quality or wildlife habitat—in the near term. Adoption of interim measures would allow the Legislature to take the time necessary to carefully consider the complex and expensive issues surrounding the restoration of the Sea that we discuss in this report.

HISTORY AND BACKGROUND OF THE SALTON SEA

History of the Salton Sea. The Sea is California's largest inland lake. It is located in southeastern California, in southern Riverside and northern Imperial Counties. (See Figure 1.) The Sea is a terminal lake, which means that it has no outlet to the ocean. Water flows into the Sea from agricultural runoff and river flows and leaves the Sea only through evaporation. Periodically over the past several thousand years, a change in the course of the Colorado River would spill water for months or years into the area now occupied by the Sea. Eventually, a subsequent change in the river's course would leave the lake without a significant source of water. Over several years it would dry up, leaving a dry lake bed. In 1905, Colorado River water overflowed from a new irrigation canal in the Imperial Valley and for several months this water flowed into the dry lake bed where the Sea now lies. In the decades since the modern Sea was created, agricultural runoff from farms in the Imperial Valley has fed the Sea, preventing it from drying up as had occurred in the past.

Today the Sea functions both as an important wildlife area and as an "agricultural sump" or drainage basin for agricultural runoff. The Imperial Valley has approximately 500,000 acres of farmland under cultivation, which is irrigated with water from the Colorado River. While Colorado River water is "fresh" and can be used for agriculture, its relatively high salt content

Figure 1

The Salton Sea and Vicinity

can create long-term agricultural management problems. In order to prevent salt build-up in the soil, farmers must allow irrigation water to drain out of their fields to carry away the salt. In the Imperial Valley, an extensive system of drains and canals transports this agricultural runoff to the Sea.

Because the Sea has no outlet to the ocean, water that enters the sea can only leave through evaporation, leaving behind the salts. Therefore, the Sea is destined to become increasingly saline over time. While the Sea started off as a fresh water body in 1905, it is now saltier than the Pacific Ocean and will become even saltier over time. As discussed in detail below, the current and future salinity of the Sea has direct impacts on the fish and wildlife in the area.

Wildlife in and Around the Salton Sea. While the Sea is a relatively new water body in geologic terms, it has become an important habitat area for a large number of birds. As shown in Figure 2, the Sea and surrounding areas are home to many species that are protected by state and/or federal law. As wetland habitat has been lost to development throughout California and northern Mexico, many bird species have come to rely on the Sea. More than 270 species of birds use the Sea on a regular basis. Hundreds of thousands of birds use the Sea as a stopover point on their annual migrations. Some species of birds—such as the double-crested cormorant—live at the Sea year round, while other species—such as snowy plovers, ruddy ducks, and snow geese—use the Sea as a stopover point on their annual migrations.

In past decades, people introduced several ocean-going fish species—such as orangemouth corvina, gulf croaker, and sargo—to allow for sport fishing at the Sea. For decades these introduced species thrived in the ecologically productive waters of the Sea. However, as the Sea has become increasingly saline over time, the varieties of fish that live in the Sea have changed. Most of the introduced species have not been found by sport fisherman or by fish surveys since 2003.

Figure 2

Protected Species Found in or Around the Salton Sea[a]

	Federally Listed Species	California Listed Species
Fish	Desert Pupfish	Desert Pupfish
		Razorback Sucker
Birds	Bald Eagle	Bald Eagle
	California Brown Pelican	California Brown Pelican
	California Least Tern	California Least Tern
	Least Bell's Vireo	Least Bell's Vireo
	Southwestern Willow Flycatcher	Willow Flycatcher
	Yuma Clapper Rail	Yuma Clapper Rail
		Arizona Bell's Vireo
		Bank Swallow
		California Black Rail
		Elf Owl
		Gila Woodpecker
		Gilded Northern Flicker
		Golden Eagle
		Greater Sandhill Crane
		Peregrine Falcon
		Swainson's Hawk
		Western Yellow-billed Cuckoo
		White-tailed Kite

[a] Includes species that are threatened, endangered, or fully protected as defined in law.

The only remaining fish species that is found in significant numbers is Tilapia. While this species has survived the increasing salinity in the Sea, the current population is estimated to be only 10 percent of the population that was present in the mid-1990s. The Department of Fish and Game (DFG) estimates that even Tilapia will not survive in the Sea once the salinity level reaches more than 60,000 milligrams per liter (mg/L) which is projected to occur by 2015. In the coming decades, only species that are adapted to very high salinities—such as Brine Shrimp—will be able to survive in the Sea. Even these salt-tolerant species will likely disappear when the salinity exceeds 200,000 mg/L. Figure 3 illustrates the increasing salinity of the Sea over time, including projections for continuing increases in future years, absent corrective action.

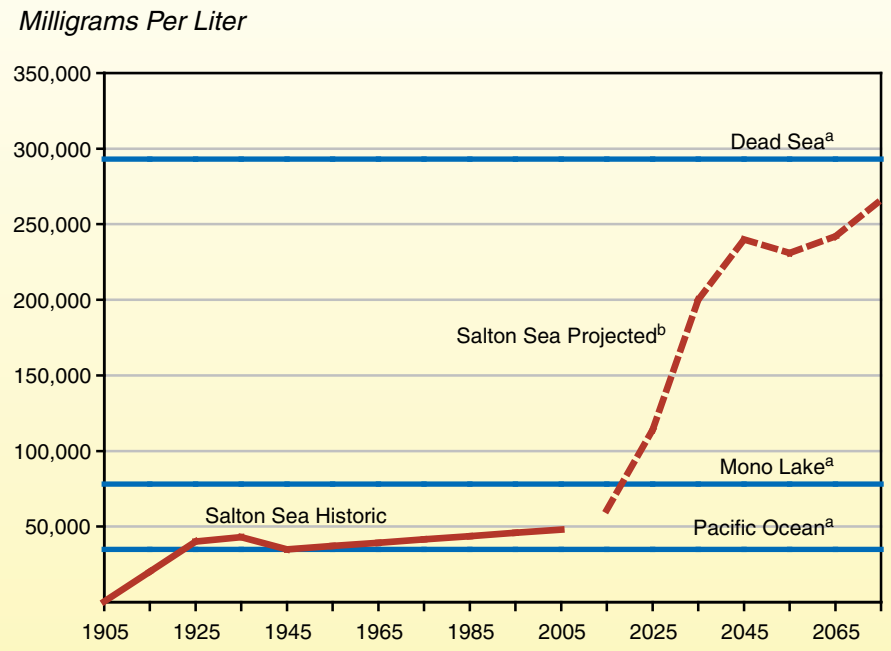
Many of the bird species found at the Sea—such as pelicans, double-crested cormorants, and black skimmers—rely on fish for their survival. As the Sea becomes too saline to support fish, these species are unlikely to survive in significant numbers in or around the Sea. However, not all bird species in the area eat fish from the Sea. There are bird species—such as the white-faced ibis—that eat invertebrates rather than fish. These bird species may not be directly impacted by the initial disappearance of fish, but in the long term increasing salinity will also reduce their invertebrate food sources.

Finally, as the Sea recedes from the current shoreline, foraging habitat and nesting grounds such as existing islands will be left behind by receding water. The loss of these existing foraging and nesting areas may reduce birds' ability to find food and may also expose them to increased predation from land animals such as coyotes.

Water Transfers Will Accelerate Sea's Increasing Salinity. As was mentioned above, the Sea is naturally becoming more saline over time. This process will be accelerated by a water transfer agreed to in 2003, pursuant to an agreement between several public water agencies and the state regarding the use of Colorado River water. This agreement is referred to as the Quantification Settlement Agreement (QSA) and we

Figure 3

Salton Sea Salinity



[a]Salinity levels for other water bodies are shown (at current levels) as constant for comparison only.
[b]Projected salinity from *Salton Sea Ecosystem Restoration Program Draft Environmental Impact Report.*

discuss its background and relevance further in the next section. As part of the QSA, the Imperial Irrigation District (IID) agreed to transfer up to 300,000 acre-feet of Colorado River water per year to other Southern California water agencies. In the long term, the water for this transfer will come from improved agricultural water efficiency in the Imperial Valley, which in turn will reduce the amount of water flowing into the Sea. Currently, the amount of water flowing into the Sea and the rate of evaporation are roughly equal, which keeps the sea level fairly constant. However, as the amount of water flowing into the Sea declines due to the water transfer, the sea level will drop (that is, the water will recede) and the salinity of the Sea will increase at an accelerated rate. While the water transfer began in 2003, IID is required to put "mitigation flows" into the Sea for 15 years or until a restoration plan is adopted. These mitigation flows are keeping the sea level in balance in the interim period while a restoration plan is developed. Ultimately, reduced inflows into the Sea will have wide ranging impacts on the Sea, which in turn could impact both human health and wildlife in the area.

WHY RESTORE THE SALTON SEA?

State's Obligation Based on Contractual Agreements and Statute. As discussed below, the state's obligation to restore the Sea, and its related financial obligation to pay for most of the restoration, has its basis in both contractual agreements and statute. The QSA, discussed in the text box (see next page), was an agreement between the state, the federal government, and a number of local water agencies that made fundamental changes to Colorado River water use in Southern California—changes which will directly impact the Sea. If not for the signing of the QSA, the federal Secretary of the Interior—the "watermaster" of the Colorado River—was prepared to institute immediate substantial reductions in California's allocation of Colorado River water. Under the existing system for allocating Colorado River water, the water agencies that serve urban water users in Southern California have the lowest priority for Colorado River water. Therefore, if the Secretary of the Interior were to have ordered immediate cuts in California use of Colorado River water, urban Southern California water users would have faced significant, immediate reductions in their water supply.

The heart of the QSA is a long-term water transfer (referred throughout this report as the "QSA water transfer") that, by reducing the amount of water flowing into the Sea, will have negative environmental impacts related to the Sea. In order to facilitate the signing of the QSA, the state agreed to assume most of the financial responsibility both for mitigating these negative environmental impacts and, more generally, for the Salton Sea restoration effort. The Legislature enacted a package of legislation in 2003 to implement the QSA. This legislation, and a companion piece enacted in 2004 (see text box on page 10), spell out the financial responsibility assumed by the state, consistent with the QSA, and also establish a number of broad goals for the restoration effort.

In addition to the state's above-noted legal obligation to restore the Sea, there are important policy reasons to restore the Sea, or at the very least, to mitigate some of the impending, adverse

environmental impacts of the QSA water transfer. These policy reasons are also discussed below.

State's Financial Obligation to Restore the Sea. During the negotiations surrounding the QSA, a critical issue was the financial responsibility for any negative environmental impacts on the Sea from the water transfer. In order to facilitate the signing of the QSA, the state (as a signing party to the QSA and in statute) agreed to assume most of the financial responsibility for the restoration of the Sea. The package of legislation implementing the QSA (hereafter referred to as QSA statutes, see text box on page 10) requires

The Law of the River and the Quantification Settlement Agreement

Law of the River. As shown in the map, the Colorado River runs within or between seven western states before crossing the border into Mexico. Under a series of laws, treaties, and court rulings known collectively as the Law of the River, the various states and Mexico have been allotted portions of Colorado River water. California is allowed to use 4.4 million acre-feet per year. The federal Secretary of the Interior is the "watermaster" for the Colorado River and has the ultimate authority for allocating water supplies under the Law of the River.

In past decades, Arizona and Nevada did not use their full entitlements and therefore California was authorized to use up to 800,000 acre-feet per year more than its legal entitlement. As population has grown in Arizona and Nevada, California was required to reduce its historic overuse of Colorado River water. In the late 1990s, the Secretary of the Interior ordered California users of Colorado River water to devise a plan to reduce their use to the state's 4.4 million acre-foot entitlement or face an immediate reduction to that level. Due to the requirements of the Law of the River, the immediate impact of a reduction in the amount of water available to California would have fallen primarily on urban water users served by the Metropolitan Water District of Southern California (Met).

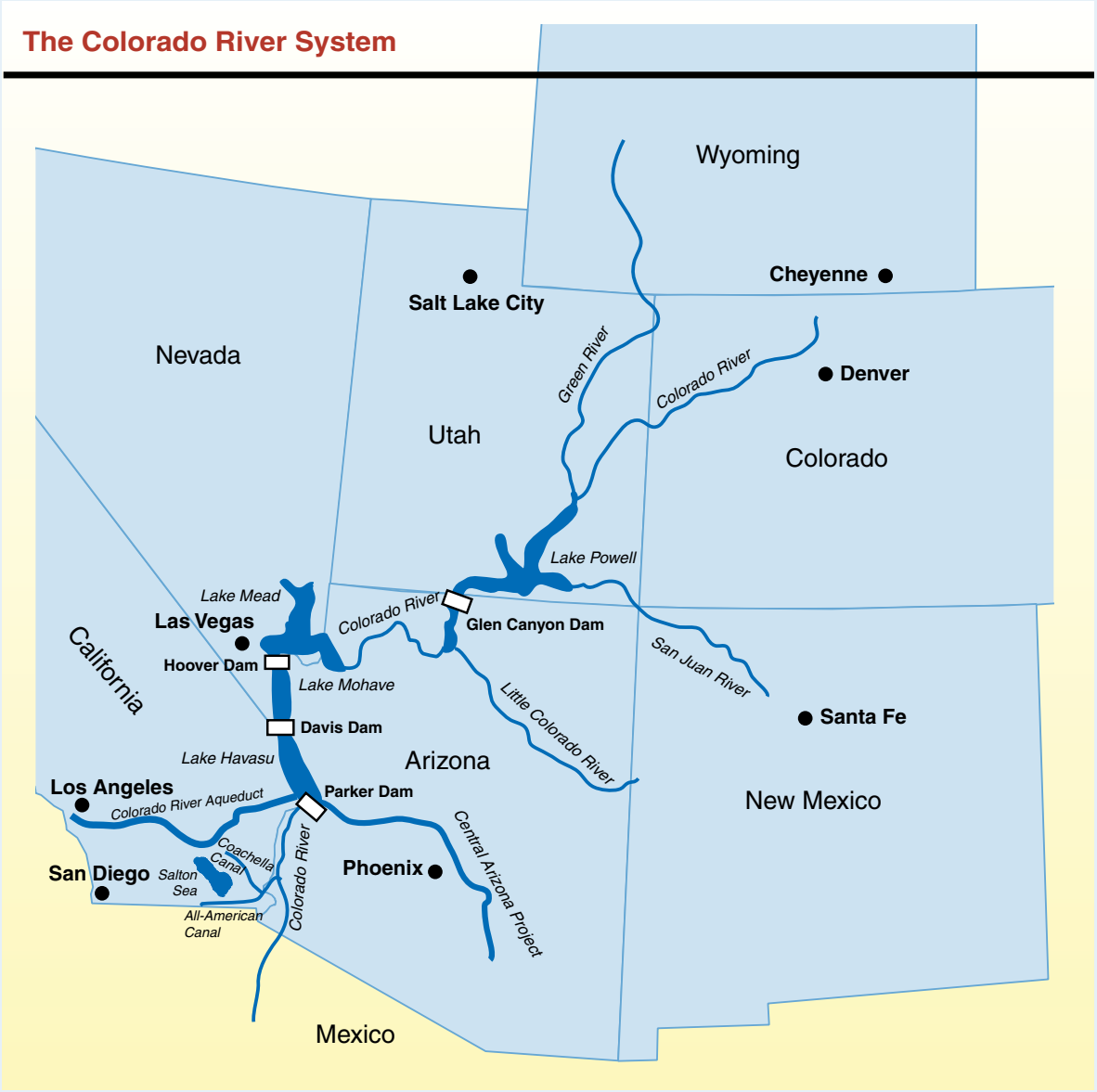
Quantification Settlement Agreement. In 2003, after prolonged negotiations between the federal government and the water districts that have a right to Colorado River water within the state, a series of agreements were made between the federal government, the State of California, the Imperial Irrigation District (IID), Met, the Coachella Valley Water District, and the San Diego County Water Authority. These agreements are known collectively as the Quantification Settlement Agreement (QSA). Under the QSA and in conjunction with laws enacted by the Legislature, the various users of Colorado River water within the state agreed to reduce their use to the allowed 4.4 million acre-feet per year over several years. The agreements include a water transfer between IID and other Southern California water districts of up to 300,000 acre-feet per year for at least 35 years and the lining of the All American Canal to save an estimated 77,000 acre-feet per year. By transferring water out of the Imperial Valley, the QSA water transfer will reduce the amount of water available for agricultural use in the Valley. In turn, this will reduce the amount of water flowing into the Sea—further increasing salinity and causing the Sea's shoreline to recede.

that the state implement a restoration project that maximizes, to the maximum extent feasible, the following three objectives:

- Restoration of long-term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife.
- Elimination of air quality impacts from restoration projects.
- Protection of water quality.

In addition to the QSA statutes, the state is a signatory to agreements that govern the water

The Law of the River and the Quantification Settlement Agreement *(continued)*



transfers relating to the QSA. As a signatory to these agreements, the state has a contractual obligation to mitigate the negative environmental impacts of the water transfers.

Beyond the contractual obligations, there are public-policy reasons for the restoration effort. In addition, there is considerable local interest in using the restoration of the Sea to spur economic

Quantification Settlement Agreement Statutes

In order to facilitate the implementation of the Quantification Settlement Agreement (QSA) discussed elsewhere in this report, the Legislature enacted a package of legislation, including:

SB 277: Chapter 611, Statutes of 2003 (Ducheny)

- Provides that the "Preferred Alternative" (the designated plan for restoring the Salton Sea) developed by the Secretary for Resources provide the maximum feasible attainment of: (1) the restoration of the long-term stable aquatic and shoreline habitat for the historic levels and diversity of fish and wildlife that depend on the Sea, (2) the elimination of air quality impacts from the restoration project, and (3) the protection of water quality.
- Creates the Salton Sea Restoration Fund (with various potential sources of money for the fund).
- Allows the Department of Water Resources to engage in future water transfers to achieve the goals of the restoration.
- Requires the Department of Food and Agriculture to report on the third party impacts of the water transfer between Imperial Irrigation District (IID) and the San Diego County Water Authority.

SB 317: Chapter 612, Statutes of 2003 (Kuehl)

- Allows the Department of Fish and Game to authorize the "incidental take" of fully protected species resulting from the impacts of the QSA, including the water transfer.
- Allows for two additional water transfers from IID to the Metropolitan Water District of Southern California (Met) of 800,000 acre-feet each, the proceeds of which would go towards the restoration effort (often referred to as the "(c)(1)" and "(c)(2)" water).
- Requires the Secretary for Resources to develop a Preferred Alternative, in consultation with the appropriate state agencies, local agencies, and the Advisory Committee. The study shall be submitted to the Legislature by December 2006. (The Preferred Alternative was submitted by the Secretary to the Legislature in May 2007.)

development and recreational opportunities in the surrounding communities. Below we discuss the objectives for the restoration.

Protecting Air Quality. Air quality in Imperial County and the Coachella Valley (eastern Riverside County) is poor. Neither area is "in attainment" for air quality standards for particulate

- Relieves IID of any liability from reduced inflows to the Sea due to any required water conservation efforts.
- Establishes an ecosystem restoration fee to be assessed on any future, non-QSA related water transfers out of IID's service area.

SB 654: Chapter 613, Statutues of 2003 (Machado)

- Extends the time to spend a prior-year appropriation of $235 million for the lining of the All American Canal (including the Coachella Branch) and groundwater recharge projects, with the conserved water going to Met.
- Creates a joint powers authority with the Department of Fish and Game and several local agencies in order to finance environmental mitigation costs relating to the QSA.
- Requires that costs up to $133 million for mitigation of negative impacts of the QSA water transfer shall be paid by IID, Coachella Valley Water District, and the San Diego County Water Authority and that $30 million shall be paid by the same agencies to the Salton Sea Restoration Fund. No further funding requirements for the restoration of the Sea by these agencies is required and all future costs to mitigate the impacts of the water transfer and restore the Sea shall be the state's responsibility.

SB 1214: Chapter 614, Statutes of 2004 (Kuehl)

- Requires that the financing plan developed by the Secretary for Resources consider funds that are, or may be available, including the Salton Sea Restoration Fund, bond funds, federal funds, money available from an infrastructure financing district, and user or other fees.
- Directs the Secretary for Resources to assess the protection of recreational opportunities and the creation of improved local economic conditions surrounding the Sea. However, recreation and economic development would not be considered restoration goals on par with the previously stated goals of wildlife habitat, air quality, and water quality protection.
- Broadens the scope of the restoration plan to include the agricultural lands surrounding the Sea and the tributaries and drains that provide water to the Sea.

matter—meaning that these areas do not meet federal and state air quality standards designed to protect public health. The term particulate matter refers to microscopic solid and liquid particles floating in the air. Over time, particulate matter can become trapped in the lungs, causing asthma attacks, bronchitis, lung diseases, and can exacerbate existing heart conditions. Particulate matter is particularly dangerous to children and the elderly. In fact, nearly 20 percent of children and adolescents in Imperial County have asthma—one of the highest rates in the state.

If the sea level declines and the shoreline recedes, it will expose areas of dry lake bed—known as "playa." In many areas, this playa is covered with fine sediments that were deposited at the bottom of the Sea over many years. Due to the high winds and arid climate around the Sea, it is likely the wind will pick up significant amounts of fine dust, increasing the amount of particulate matter in the air and further reducing the air quality in the Imperial and Coachella Valleys.

In addition to the likely adverse impacts on air quality from a decline in the Sea's shoreline level, there will also be adverse air quality impacts from restoration activities themselves. Because all of the alternatives under consideration for restoring the Sea include significant construction activities, there will be large amounts of dust and soot created during the construction phase. Any restoration activities are required under law to minimize or eliminate the air quality impacts caused by the construction. These requirements, while potentially complicating the restoration effort and increasing costs, will prevent air quality from degrading even further. (It is important to note that none of the restoration alternatives is likely to significantly *improve* the existing air quality in the region.)

Protecting Wildlife Habitat. Since its creation in 1905, the Sea has become a key habitat area for many species, several of which are threatened or endangered and thus have protected status.

- ***Bird Species.*** There are several protected bird species—and very large numbers of individual birds—found in and around the Sea. (See Figure 2.) Protected bird species found in and around the Sea include brown pelicans, least terns, willow flycatchers, and yuma clapper rails. The Department of Fish and Game estimates that only 5 percent of the historic Central Valley wetland habitat remains today; the loss of wetland habitat in the Central Valley and along the coast has left migratory bird species with limited alternatives to the Sea.

- ***Fish Species.*** Desert pupfish, an endangered species under both the federal and state endangered species acts, live in creeks and drainage ditches around the Sea. While the pupfish do not live directly in the Sea, these fish are known to migrate between creeks and drainage ditches through the Sea's shoreline waters. As the shoreline recedes and the remaining Sea becomes increasingly saline, these pupfish populations may become isolated from one another. This will reduce the genetic diversity of existing populations, which could make them less able to adapt to disease or other environmental stresses. It would also prevent existing populations from moving back and forth between habitat areas as conditions change. Both of these impacts could

reduce the species' long-term chance of survival.

Because there are federal and state listed endangered species in and around the Sea, there are regulatory requirements that restrict the "take" of these listed species (causing harm to the species) due to the QSA-related water transfer. At the state level, the QSA implementing legislation authorizes the Department of Fish and Game to allow the incidental take of endangered species due to the effects of the QSA and related water transfers—provided that ongoing management of those species continues to support the overall existing populations. Under federal law, the U.S. Fish and Wildlife Service has adopted a biological opinion on the QSA-related water transfer that allows the incidental take of federally listed species—providing that ongoing mitigation requirements are met by the Bureau of Reclamation and the IID (ongoing efforts separate from the restoration).

Improving Water Quality. The Sea is neither a source of drinking water nor irrigation water, due to its high salinity. However, the Sea's water quality will have a direct impact on its ability to provide wildlife habitat. There are three main aspects to water quality problems in the Sea: salinity, nutrients, and selenium.

The increasing salinity of the Sea will eventually destroy the fishery, eliminating the source of food for fish-eating bird species. For some years, salt-tolerant species such as Brine Shrimp will survive at the Sea, but ultimately the water will become too saline for even these species.

As agricultural irrigation water drains into the Sea from the surrounding farmland and as polluted water from the Alamo and New Rivers flows into the Sea, the nutrient levels in the Sea—particularly nitrogen—have grown extremely high. Due to the high level of nutrients and the strong sunlight in the area, algal and bacterial production in the Sea is very high. In deeper waters, the decay of dead bacteria leads to the production of hydrogen sulfide. Periodically, this hydrogen sulfide is released from the deeper waters, consuming the oxygen in surface waters through a chemical reaction, as well as releasing noxious odors into the area surrounding the Sea. When oxygen in the surface water becomes depleted, extensive fish kills occur, with thousands of dead fish washing up on the shores of the Sea. While it is unlikely that these processes threaten human health or the long-term biological productivity of the Sea, these phenomena have had a significant, negative impact on recreational use of the Sea.

Finally, there are long-term concerns about the presence of selenium in the Sea. Selenium is a naturally occurring element that is necessary, in very small amounts, for biologic processes. However, in elevated levels, selenium has been found to cause significant birth defects and reproductive problems in wildlife. Colorado River water has elevated levels of selenium, which comes from eroding rocks upstream. There are concerns that as the selenium level in the Sea increases over time (since there is no outlet), the increased levels could compromise the reproduction of birds in and around the Sea. To date, there is no evidence that this has occurred, and in fact the level of selenium in the Sea water is currently relatively low, indicating that is has settled out into the sediments. However, as these sediments are uncovered by a receding shoreline, selenium contamination may become a greater concern.

In addition to the state's restoration process, the Regional Water Quality Control Board for the Colorado River Region is in the process of implementing plans—referred to as Total Maxi-

mum Daily Loads (TMDLs)—to address pollutants such as silt and other specific nutrients in the rivers and drainage canals that feed the Sea. (A TMDL is a planning and regulatory tool used by the state to reduce pollution in seriously impaired water bodies that do not comply with the requirements of the federal Clean Water Act.) Under these TMDLs, pollution dischargers—primarily Imperial Valley farmers—are required to reduce the amount of silt and nutrients flowing into drainage canals and streams that flow into the Sea. Over coming decades, these TMDLs should reduce nutrient levels within the Sea. It is not clear, however, whether the TMDLs alone will reduce nutrient levels enough to prevent future fish kills or hydrogen sulfide releases. While the regional board is also developing a TMDL for selenium, it has not yet determined whether it will do so for salt. In summary, the day-to-day regulatory activities of the regional board and the state's overall Salton Sea restoration effort will likely complement each other in addressing water quality issues in the Sea.

Facilitating Recreation and Economic Development. In past decades, the Sea was a popular recreational area. Because of the warm winter climate, proximity to southern California cities, large size, and active fishery, the Sea was a popular recreational destination for fisherman and water sports enthusiasts. However, increasing levels of salinity have significantly reduced the presence of fish in the Sea. In addition, as the Sea has become increasingly nutrient-rich, the occurrences of fish die-offs and unpleasant odors have made the Sea a much less attractive destination for recreation. If the Sea were restored such that fishing and boating became more attractive, there would be significant recreational potential at the Sea. There is strong local interest in using the restoration of the Sea as a way to jumpstart recreation-based economic development in the area.

THE RESTORATION PLANNING PROCESS

State, Federal, and Local Processes

Many Agencies Potentially Involved in Restoration. There are many federal, state, and local agencies that are, or may be, involved in the restoration to some degree. With respect to wildlife protection, the Department of Fish and Game and the federal Fish and Wildlife Service have been, and will continue to be, involved in efforts to protect wildlife and their habitat. In addition, the Wildlife Conservation Board is likely to be involved in land purchases that are necessary to facilitate the restoration. With regard to air quality, the local air districts (Imperial County Air Pollution Control District and the South Coast Air Quality Management District), the State Air Resources Board, and the federal Environmental Protection Agency all have some jurisdiction over air quality issues in the region surrounding the Sea. Agencies involved with water issues include the federal Bureau of Reclamation and Department of the Interior, the Department of Water Resources, the Colorado River Basin Regional Water Quality Control Board, and the State Water Resources Control Board. Most of these agencies, and many others, sit on the Salton Sea Advisory Committee discussed below.

In order to develop restoration plans, planning processes have been established at each level of government, as we discuss below.

State Process. Legislation that implemented the QSA created a process for developing a Salton Sea restoration plan. Under this process, the Secretary for Resources has the responsibility to develop a preferred restoration plan and submit such a plan to the Legislature by December 2006. To this end, the Secretary for Resources has led a public process to create alternative restoration plans. These plans are included in the draft Programmatic Environmental Impact Report which was released in October 2006. This document includes information about all the restoration alternatives under consideration.

Throughout the restoration planning process, the Secretary has been advised by the Salton Sea Advisory Committee, a body created in statute that is made up of relevant federal, state, tribal, and local government agencies, as well as representatives of the local community and environmental groups. (See Figure 4 for a list of the Advisory Committee members.) The Secretary selected a Preferred Alternative and formally recommended it to the Legislature in May 2007. While statute requires the Secretary to develop and recommend a Preferred Alternative, the authority to adopt and fund such a restoration plan, or an alternative plan, lies with the Legislature.

Figure 4

Members of the Salton Sea Advisory Committee

Federal Agencies
Bureau of Indian Affairs
Bureau of Reclamation
Fish and Wildlife Service
Geological Survey
Environmental Protection Agency

Tribal Governments
Torres-Martinez Desert Cahuilla Indians
Cabazon Band of Mission Indians

State Agencies
State Water Resources Control Board
Colorado River Basin Regional Water Quality Control Board
California Air Resources Board

Local Agencies
Metropolitan Water District of Southern California
San Diego County Water Authority
Coachella Valley Water District
Imperial Irrigation District
Imperial County
Riverside County
Imperial County Air Pollution Control District
South Coast Air Quality Management District
Coachella Valley Association of Governments
Imperial Valley Association of Governments

Nongovernmental Organizations
California Farm Bureau Federation
Riverside County Farm Bureau
Imperial County Farm Bureau
Defenders of Wildlife
California Waterfowl Association
Pacific Institute
United Anglers of Southern California
Audubon California
Sierra Club
CalEnergy Operating Corporation
New River Citizens Congressional Task Force

Federal Process. Under existing federal law, the federal Bureau of Reclamation is required to develop a restoration plan for the Sea. Unlike the state, however, there is no existing requirement that the federal government participate in the restoration of the Sea. The Bureau of Reclamation was required to present a restoration plan to Congress by the end of 2006, after which time the Congress may consider whether to participate in any restoration. (At the time this report was written, the Bureau's restoration study had been approved and was awaiting publication.)

Aside from its potential *voluntary* participation in a future restoration of the Sea, it is unlikely that the federal government would be heavily involved in regulatory issues related to the Sea. For example, state and local agencies are generally responsible for enforcing the air quality and water quality requirements of federal laws such as the Clean Air Act and the Clean Water Act, respectively. Thus, the federal government is not likely to be directly involved in regulating potential water quality or air quality impacts relating to the Sea. With regard to wildlife protection, the federal Fish and Wildlife Service has drafted a biological opinion related to the QSA and the associated water transfers. Under the biological opinion, as long as certain actions are undertaken by the local water agencies (and these are underway), the Fish and Wildlife Service has determined that the water transfers are not likely to jeopardize the survival of any federally listed endangered species located in or around the Sea. Therefore it is unlikely that there will be significant federal *regulatory* action relating to wildlife around the Sea.

Local Process. In addition to the state and federal agencies involved in restoration planning, there has always been considerable local interest in the restoration of the Sea. The lead agency at the local level is the Salton Sea Authority (Authority). The Authority is a state-chartered joint powers authority, comprised of Imperial County, Riverside County, the Imperial Irrigation District, the Coachella Valley Water District, the Torres-Martinez Tribe, and the Cabazon Tribe. The Authority was created to work with California state agencies, federal agencies, and the Republic of Mexico to develop programs that would continue beneficial use of the Sea—including preserving the Sea as a depository for agricultural drainage, storm water, and wastewater flows; for protection of endangered species, fisheries, and waterfowl; and for recreational purposes. The Authority has been heavily involved in the restoration planning process and has developed its own restoration plan. The Authority's initial restoration proposal was included in the state's restoration planning process as one of eight alternatives evaluated by the Secretary. (See "Alternative 7" in Figure 5 on page 19.) Subsequently, the Authority has made some modifications to its proposal, for example increasing the amount of wildlife habitat.

Restoration Alternatives Under Consideration

The Secretary and the Advisory Committee considered a series of potential alternative restoration plans. As discussed below, the eight alternatives under consideration were all designed as integrated restoration plans. In other words, while each of the restoration alternatives has components that address the various issues of concern—such as air quality or wildlife habitat—the benefits of these alternatives will generally be fully realized once the *entire* project has been constructed. An analogy would be the construc-

tion of the State Water Project. Just as the State Water Project did not achieve its purpose of providing water supplies to the Central Valley and Southern California until the system of reservoirs, pumps, and canals was linked together, the goal of restoring the Sea will likely only be fully realized once all the components of one of the alternatives (or a variation thereof) are completed. It is important to keep in mind that there would likely be little value in constructing a partial restoration plan, should financing pressures make it difficult to complete the chosen plan.

The Programmatic Environmental Impact Report which was released in October 2006 includes eight project alternatives to restore the Sea. In order to meet the restoration goals outlined in statute, each of the project alternatives includes at least some of the following components, which address different restoration goals:

- ***Saline Habitat Complex—***a series of shallow water bodies, less than six feet deep, constructed on the exposed Sea bed. The purpose is to provide habitat for birds that currently live in and around the sea. The salinity within the individual water bodies could be controlled to provide appropriate fish and bird habitat.

- ***Deep Marine Sea—***a large, open body of water with salinity similar to ocean levels, with depths up to 50 feet. It would be designed to provide habitat for birds and fish similar to what historically existed at the Sea. In general, a deep marine sea would be formed by constructing a rock barrier across the width of the sea, dividing it roughly in two.

- ***Moderately Deep Marine Sea—***similar to the deep marine sea, this component would provide a large body of open water with salinity similar to ocean levels, but with water depths not more than around ten feet. (Limiting the depth of a marine sea will likely reduce the buildup of hydrogen sulfide gas within the Sea.)

- ***Air Quality Management—***measures designed to minimize airborne dust from exposed playa. This would include measures such as irrigated vegetation or the formation of a salt crust on the exposed playa.

- ***Desert Pupfish Connectivity—***a series of channels between the various existing pupfish habitat areas around the Sea, in order to allow movement between these habitat areas.

- ***Brine Sink—***a central body into which water would flow after it had passed through other project components, such as a saline habitat complex or marine sea. Over time, the water in a brine sink would become extremely saline.

- ***Freshwater Reservoir—***a separate reservoir adjacent to the Sea, designed to hold irrigation water.

Figure 5 (see next page) illustrates the alternatives that were considered by the Secretary, with estimated construction costs ranging from $2.3 billion to $5.9 billion. It should be noted that when QSA-related legislation was being considered by the Legislature, there were no fiscal estimates at that time of the state's potential fiscal exposure by committing to restore the Sea. While

Figure 5

Salton Sea Restoration Alternatives

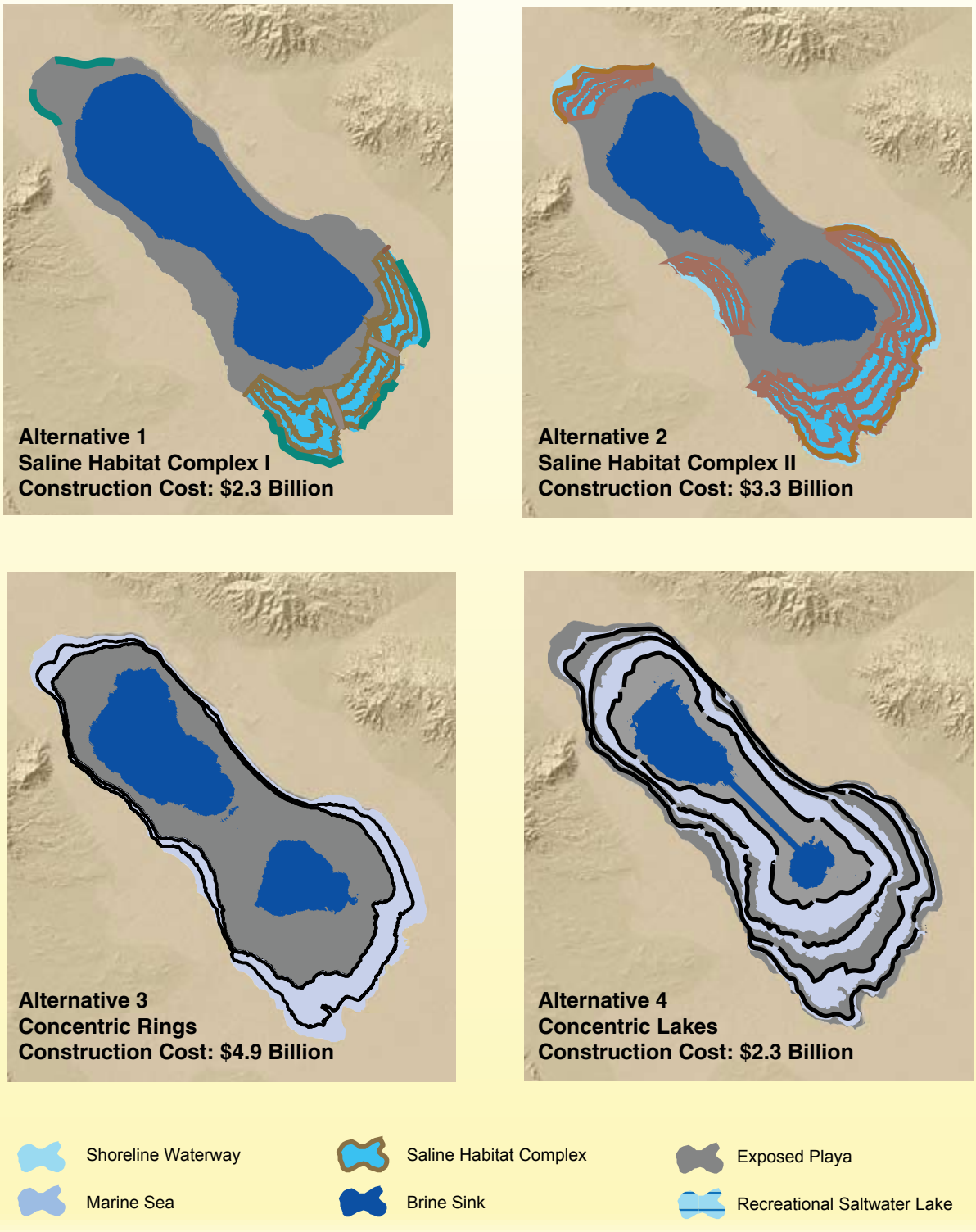
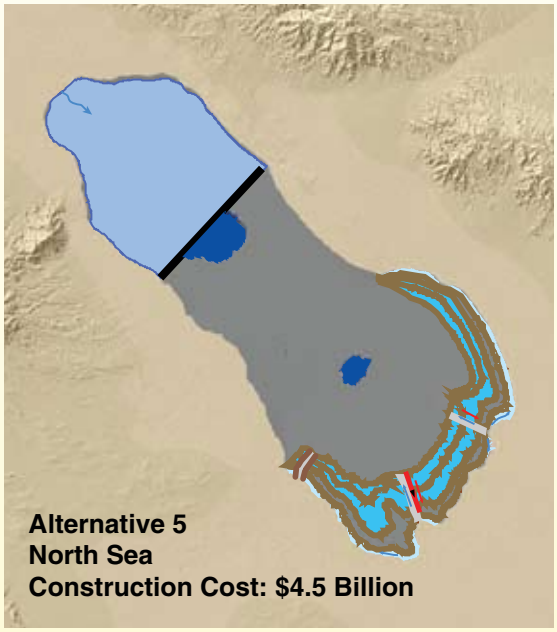
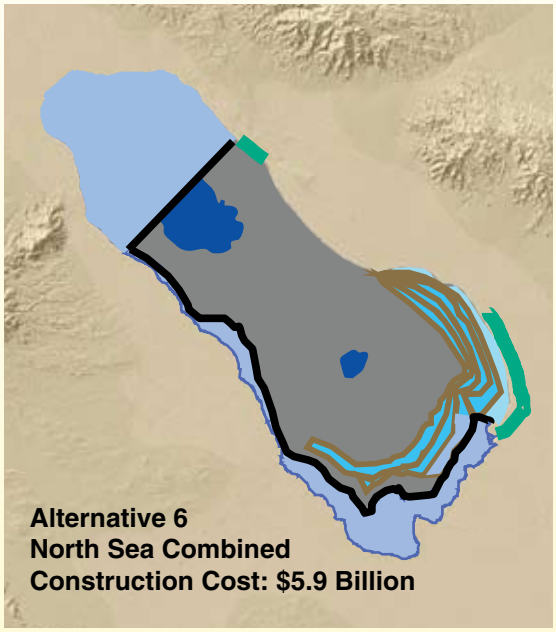
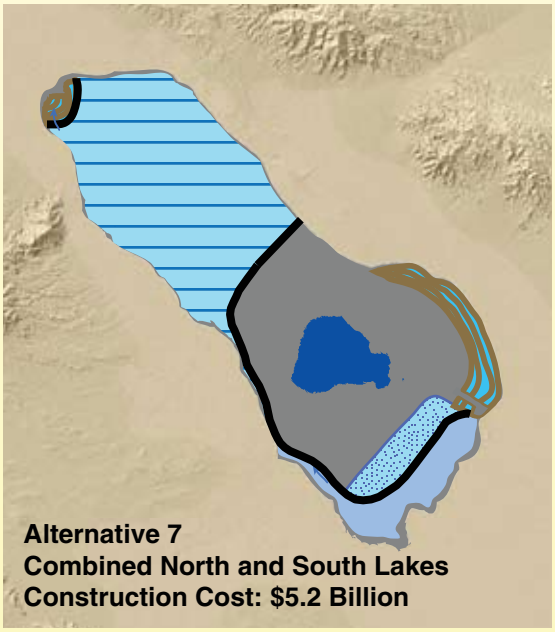


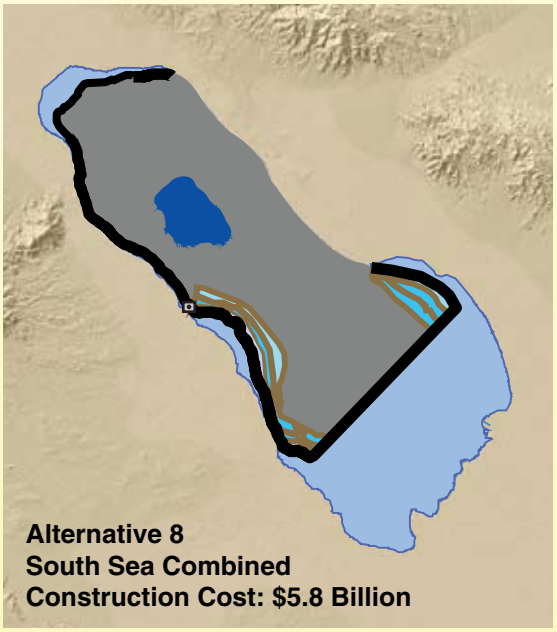
Figure 5 (continued)

Salton Sea Restoration Alternatives









Recreational Estuary Lake

IID Freshwater Reservoir

Perimeter Dike/Berm

Pupfish Channel

each of the alternatives was designed to address the statutory objectives for the restoration, they vary in the extent to which they address the restoration goals. For example, some alternatives provide more wildlife habitat acreage (Alternative 4) or open Sea area (Alternative 7) than others. Also, the location of any barrier to divide the Sea will have significant impacts on the future Sea's recreational and economic uses. All of these factors were considered in the process of selecting the Preferred Alternative. The alternatives were compared against a "no action" alternative that reflects the Secretary's best estimate of what would happen to the Sea if a full restoration were not undertaken. However, this no action alternative assumes that the state would still undertake certain environmental mitigation activities, even without a full restoration. In particular, it was assumed that the state would still perform some basic air quality mitigation activities to prevent serious harm to air quality in the region. This no action alternative is projected to have a construction cost of approximately $800 million.

It is important to note that for most of these alternatives, significant construction would not begin until the Sea begins to recede (likely starting in 2017). In most cases, construction would be spread over many years. Additionally, all of the alternatives under consideration would require significant annual operational costs.

The Preferred Restoration Alternative

Choice of the Preferred Alternative. Once the alternatives were developed, the Advisory Committee created several working groups—including a habitat working group, an air quality working group, a water quality science panel, and a process working group—to advise the Advisory Committee on the alternatives. In addition to the statutory goals for the restoration, the Advisory Committee determined that the working groups should also consider some additional restoration goals, including: recreational and economic development opportunities; compatibility with existing and planned land uses around the Sea; changes to microclimates around the Sea from the restoration; adaptability of the alternatives to changes in climate, water inflows, and habitat characteristics; environmental justice considerations; and potential noise and traffic impacts of construction activities. The working groups compared the various alternatives based on how well each of the alternatives met the statutory and supplemental goals for the restoration. The working groups then reported back to the Advisory Committee on the alternative or alternatives that best met the criteria.

Based on the evaluation of each of the alternatives from these specialized working groups, the Advisory Committee found that the key characteristics for a restoration plan were that it include saline habitat and a marine sea, early start habitat, air quality mitigation, and limited Sea depth to improve water quality and prevent odors. According to the Advisory Committee, Alternative 5 (North Sea alternative) best met the objectives for restoration. However, from the consensus process, the Advisory Committee indicated that the final alternative should include additional saline habitat and shoreline access adjacent to existing communities (Salton City and Bombay Beach), allowing for recreation and economic development in these communities.

The Secretary then developed a Preferred Alternative based on Alternative 5 and incorporating the comments of the Advisory Committee. The final Preferred Alternative was further re-

fined to reflect comments on the draft *Programmatic Environmental Impact Report* made by individual advisory committee members, other public agencies, interest groups, and members of the public. Figure 6 (see next page) illustrates the Preferred Alternative that was recommended by the Resources Secretary to the Legislature.

Design Features of the Preferred Alternative. The Preferred Alternative includes:

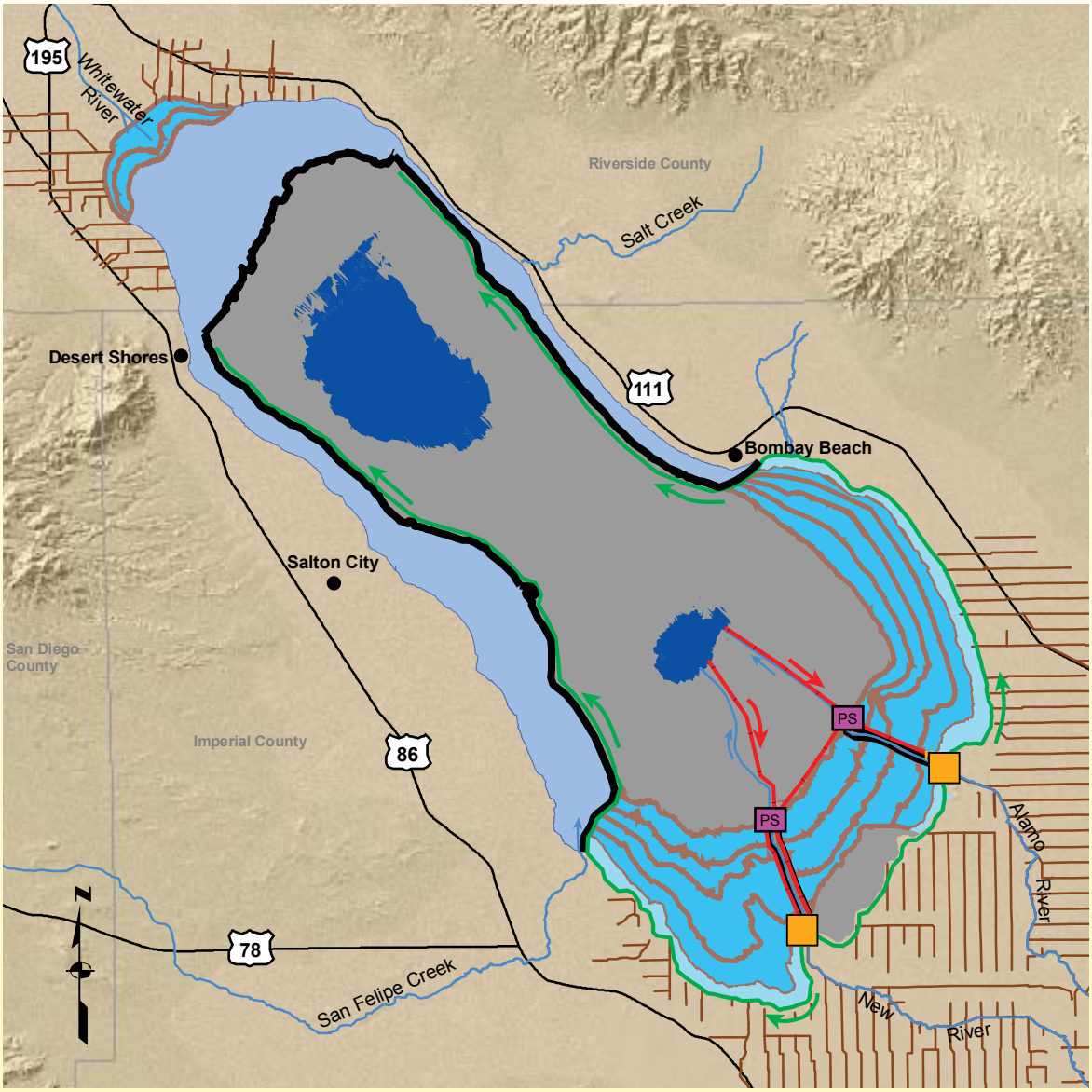
- Saline habitat complexes at both the north and south ends of the Sea, to provide wildlife habitat, primarily for bird species.
- Early start habitat that could be constructed before the full-scale habitat complexes are constructed, to provide wildlife habitat in the early years, before the project is fully completed.
- A large marine sea in a "horseshoe" shape that extends from the northern edge of the sea south along both the western and eastern shores of the existing Sea (with a maximum depth less than 40 feet to prevent the buildup of noxious gasses at depth). This will provide both open water fish and bird habitat and recreational opportunities.
- A large area of exposed playa in the center of the Sea, with facilities for air quality management on the playa to reduce dust emissions. The air quality management facilities may include irrigated plants, flooded areas, and/or the creation of a salt crust to trap dusty soils. The playa would be separated from the marine sea by a 52-mile-long barrier running from about San Felipe Creek to just below Bombay Beach.
- Two brine sinks, essentially low spots within the exposed playa area of the existing Sea, into which excess water will flow and which will become extremely saline over time.
- The possibility of future development of additional geothermal energy production at the south end of the Sea.

Cost of the Preferred Alternative. The Secretary's projected capital cost for the Preferred Alternative is $8.9 billion. As originally designed, Alternative 5 included a barrier (or dam) that was essentially a straight line across the Sea close to its narrowest point, with a projected construction cost for the barrier and perimeter dikes of $1.6 billion. In order to increase shoreline access for existing communities along both sides of the Sea and to reduce the depth of the remaining Sea, the Preferred Alternative includes a redesigned barrier in a horseshoe shape. This redesigned barrier allows for access to the marine sea along both the east and west shores of the existing Sea. The redesigned barrier and perimeter dikes are now projected to cost $4 billion to construct—the major factor driving the higher cost of the Preferred Alternative. The sharply increased cost for the barrier is a function of its increased length (from 9 miles to 52 miles) and it also reflects the more refined fiscal analysis that was done on the Preferred Alternative (relative to the other alternatives). It is important to note that the costs of any of the alternatives under consideration are likely to increase if they undergo the additional scrutiny that was applied to the Preferred Alternative.

Under the Preferred Alternative, during a preconstruction period between 2011 and 2013,

Figure 6

Preferred Alternative



Marine Sea
Exposed Playa
Saline Habitat Complex
Brine Sink
Shoreline Waterway

PS Saltwater Pump Station
Sedimentation/Distribution Basin
Barrier

0 5 10 Miles

Air Quality Management Canal
Saltwater Canal
River/Creeks
Highways
Agricultural Drain

approximately $500 million would be spent on planning and early start habitat. During the major construction period of 2014 through 2020, $5.9 billion would be spent, primarily on constructing the barrier to divide the Sea, as well as constructing water conveyance structures and wildlife habitat. In the construction period of 2020 through 2025, $690 million would be spent on creating additional wildlife habitat and air quality management facilities. In the construction completion period of 2025 through 2035, $1.8 billion would be spent on wildlife habitat and air quality management facilities. In addition to the capital costs, the estimated operations and maintenance costs for the Preferred Alternative would begin at about $50 million per year in 2025 and increase to $140 million per year by 2035.

While the Secretary developed cost estimates for all of the alternatives under consideration, the Preferred Alternative was most closely scrutinized and hence includes the most realistic cost estimates. If the Legislature wishes to proceed with a different alternative, such a choice will likely require significant additional study before the costs and technical feasibility are fully known.

Evaluating the Alternatives. We do not recommend for or against the Secretary's preferred restoration alternative—or any of the potential restoration plans. Assessing the technical differences between the various alternatives is beyond the scope of this report. Rather, we recommend a number of steps for the Legislature to take—including policy and fiscal issues to consider—prior to adopting a restoration plan. We believe these steps provide a framework that will allow the Legislature to make an informed decision about how to address issues surrounding the Salton Sea within the state's funding constraints.

RECOMMENDATIONS AND ISSUES FOR LEGISLATIVE CONSIDERATION

Now that the Secretary has designated a Preferred Alternative, the Legislature—working with the administration—will determine how to proceed with the restoration of the Sea. The statutes implementing the QSA do not require that the Legislature adopt the Preferred Alternative developed by the Secretary. However, state law does place financial responsibility for mitigating the negative impacts from the QSA water transfer—and more generally for restoring the Sea—largely on the state. As the Legislature considers how to proceed, there are several steps that it should take. We believe these steps provide a framework that will allow the Legislature to make an informed decision about how to address issues surrounding the Sea within the state's funding constraints.

As we discuss in detail below, we recommend three major steps for the Legislature to take. First, we recommend the Legislature set its expenditure priorities. We recommend the Legislature establish the protection of air quality and the preservation of wildlife habitat as the highest expenditure priorities. Second, we recommend the Legislature formally adopt a restoration plan. The restoration plan should reflect the Legislature's priorities, realistically consider the potential sources of funding for restoration activities, and designate an implementing agency—in this case, we recommend the Department of Water

Resources as the implementing agency. We also recommend that the Legislature formally adopt its restoration plan in statute before proceeding with major restoration activities. Third, we recommend the Legislature consider adopting interim measures to address priority impacts while it deliberates on the issues surrounding the restoration.

Setting Priorities

The Importance of Setting Priorities. State law addressing the QSA requires the restoration plan to address several adverse impacts of the water transfer—reductions in habitat, air quality, and water quality. However, statute does not set priorities among these different impacts. The Preferred Alternative that has been presented to the Legislature appears to address each of these impacts as relatively equal priorities. However, given both the enormous potential costs of the restoration and the state's ongoing fiscal difficulties, it may not be practical to adopt a restoration plan that addresses each impact and restoration objective as comprehensively as proposed. If the state's fiscal condition requires the Legislature to reduce the scope of the restoration or delay certain portions of it, there is no existing statutory direction indicating which aspects should be a higher priority over others. Given this, we recommend that the Legislature specifically determine its priorities.

Setting legislative priorities in statute would provide a basis for adopting a restoration plan that fits identified resources. It is important to note that it would not likely be practical to scale down any of the proposed restoration plans once construction has begun. Each of the restoration alternatives under consideration is an integrated plan that would only provide benefits once the entire plan is constructed. For example, there would be very little value in constructing one-half of the barrier to divide the Sea that is proposed in the preferred alternative. The purpose of setting legislative priorities up front is that it would allow the Legislature to decide what plan best addresses legislative priorities with identified resources, *in advance* of construction.

While there are good policy reasons to mitigate all of the impacts discussed in the QSA statutes, we recommend the Legislature place the greatest priority first on air quality impacts and second on potential habitat loss resulting from the water transfer. Actions to address the loss of the Salton Sea fishery and water quality impacts of the water transfer, as well as facilitating economic development in the area, should be considered lower priorities.

Mitigating Air Quality Impacts. The state's first priority should be to mitigate the air quality impacts of the water transfer. Air quality in the communities surrounding the Sea is already impaired and there are potential adverse health impacts of increased particulate pollution from a receding shoreline. For example, asthma, heart disease, and other pulmonary conditions are affected by air pollution and may increase should air quality decline. While the costs to mitigate air quality impacts could be substantial in their own right (see text box on the Public Costs of Owens Lake Dust Mitigation), the potential health impacts argue for the state to make this a high priority.

Protecting Habitat. The state's second priority should be protection of the habitat of protected species (including species that are threatened, endangered, or fully protected under state law; see Figure 2). As discussed earlier, there are dozens of bird species that use the habitat in and around the Sea—many of which have protected

status under state law. The QSA statutes allow the Department of Fish and Game to issue an incidental take permit to the parties to the QSA water transfer, but this authority is predicated on the state taking action to protect the overall health of these species. Because the state has lost so much of its historic wetland habitat, many migrating bird species have come to rely on habitat in and around the Sea during their annual migrations. Any further loss of habitat for these species could further imperil their long-term survival. In order to protect these species, the state should make the mitigation of wildlife habitat loss due to the water transfer a priority.

Issues of Water Quality and Economic Development. The Sea is a terminal lake that is destined to become increasingly saline over time without human intervention. Additionally, there is no simple or inexpensive way to reduce salinity in the Sea. Addressing salinity will require the construction of a fully integrated restoration plan, as is proposed in the various restoration alternatives. As we discussed in detail above, any full restoration plan that addresses water quality in the Sea will be very expensive and take decades to complete.

Salton Sea water, given its high salinity, is neither a source of irrigation nor drinking water. It does not appear to be economically feasible to improve water quality in the Sea to the point that it could be used for these purposes. Rather, improving water quality in the Sea is a means to accomplish other goals—preserving habitat for fish and the birds that feed on them and allowing for human recreation and the economic development that follows.

While improving water quality in the Sea would benefit wildlife, there may be other ways to more directly preserve wildlife habitat without incurring the very substantial costs required to improve water quality in the Sea—such as constructing and managing saline habitat around the perimeter of the existing Sea. Given that there may be opportunities to protect wildlife habitat more cost-effectively and that recreation and economic development are not statutory goals

Owens Lake Dust Mitigation: A Case of Substantial Public Costs

During the early part of this century, the Los Angeles Department of Water and Power purchased much of the water rights in the Owens Valley (located along the eastern Sierra Nevada mountains) and began diverting this water to Los Angeles. By the 1920s, Owens Lake had dried out, leaving behind a dry lake bed. Due to high winds in the area, Owens Lake generates very large amounts of fine, airborne dust—greatly reducing air quality in the Owens Valley. In 1998, the City of Los Angeles signed an agreement with the Great Basin Unified Air Pollution Control District to mitigate the dust that was impairing air quality in the Owens Valley. Since that time, the Department of Water and Power has implemented dust control measures on 23 square miles (about 15,000 acres) of lake bed, with 19 more square miles to be completed later this year. Dust control measures include, for example, irrigating areas to support plant cover or flooding certain areas. At completion of the project, the department will have spent $520 million in capital costs, with estimated operations costs of $41 million per year.

for the restoration (and could be addressed by local government and private enterprise), we recommend the Legislature make directly improving water quality a lower priority than preserving air quality and directly preserving wildlife habitat. In our view, the state should direct limited funding to existing statutory and legal obligations in the near term.

Finally—and aside from the restoration goals described above—the Legislature should consider how the restoration of the Sea fits into the state's overall plans for meeting its water supply needs. While an in depth discussion of the state's future water supply needs is beyond the scope of this report, please see the nearby text box for a brief discussion of particularly significant restoration issues relating to the state's water supply needs.

Adopting a Comprehensive Plan for the Restoration

The statutes governing the QSA describe in very general terms the state's responsibility for restoring the Sea and limit the financial contribution of specified local water districts. While statute does not require the Legislature to adopt a plan for restoring the Sea, we recommend that the Legislature adopt such a long-term plan. As discussed earlier, any restoration of the Sea will take decades to accomplish and potentially cost billions of dollars. It is critical for the Legislature to decide—in advance—what the state does and does not intend to accomplish from the restoration and what the Legislature's expenditure priorities are. There are other critical issues that should also be decided by the Legislature in the context of formally adopting a restoration plan—including deciding how the restoration will be financed and setting up a governance structure for the restoration. We believe these issues should be decided by the Legislature *before* the state embarks on making large outlays of public funds for the restoration, and we discuss them in the following sections.

Deciding How to Pay for the Restoration

All of the restoration alternatives that have been developed by the Secretary are very expensive, including the simple "No Action" alternative. The projected costs—from $800 million to $8.9 billion in construction costs, plus tens of millions of dollars per year in operating costs—will require a substantial funding commitment from the state. Adopting any of the proposed alternatives will commit the state to what will be one of its largest ever environmental restoration projects. We believe it is critical that the Legislature carefully consider the financial side of the restoration before committing to a specific restoration plan. As we discuss further below, we do not believe that the state can count on significant funding from either the federal government or local governments for this purpose. Ultimately, we believe that state funds—namely the General Fund, either through direct appropriations or in support of bond financing—will be called upon to pay the bulk of the cost to restore the Sea.

Restoration Plan Should Include Comprehensive Financing Plan. In addition to developing the Preferred Alternative, the Secretary is required to develop a financing plan for the restoration. In recommending the Preferred Alternative, the Secretary has included a very general funding plan for the restoration. The funding plan identifies potential revenue sources that *could* be used to fund the restoration, such as future bond funds, the General Fund, federal funds, and local assessments. However, it does not include any specific proposals for how the capital costs and

the operational costs of the restoration *should* be allocated amongst the various potential funding sources. Nor does it realistically assess the likelihood of any of these potential funding sources being available for the restoration.

We recommend that the Legislature adopt a realistic and comprehensive funding plan as a part of the restoration plan. Such a comprehensive financing plan should include both a schedule of future costs and a specific allocation among funding sources to meet those future costs. In developing the plan, a number of criteria should be applied. First, the plan should make a realistic assessment of available funding. Second, the plan should apply the "beneficiary pays" principle to the extent possible. Third, the plan should respect any current statutory or contractual conditions that limit the contributions from specified local water districts.

Given the state's ongoing budgetary constraints and the uncertainty of any significant future federal funding, we think it is critical that the Legislature decide what the state can realistically afford to spend on the restoration when deciding which restoration plan to pursue.

Limited Options for Securing Nonstate Funds. In general, we have recommended that the state follow the beneficiary pays and "polluter pays" principles when funding environmental programs. In this case, however, statutory and state contractual obligations severely limit the Legislature's ability to follow these principles in obtaining significant amounts of nonstate funds to pay for the restoration. Specifically, the QSA statutes and contractual agreements explicitly limit the financial liability of the IID and other "polluters" (in this case, the "pollution" is the reduced inflows into the Sea, rather than traditional water or air pollution). Additionally, while protecting and restoring fish and wildlife habitat may have some direct beneficiaries—such as bird watchers or recreational fisherman—for the

Restoration and Potential Future Water Transfers

One issue that the Legislature should consider is how the restoration effort could be impacted by potential developments in meeting the state's long-term water needs. The Secretary's Preferred Alternative is based on inflows into the Sea of at least 650,000 acre-feet per year in at least 80 percent of years (known as the "design flow"). These inflow projections take into account a variety of potential changes to water use in the areas surrounding the Sea—including changes in water quality regulations and increased water recycling in Mexico.

However, one variable not considered in the Secretary's Preferred Alternative is the possibility of future water transfers out of the Imperial Valley (in addition to the QSA water transfer). In the near term, such additional water transfers are unlikely. However, over the restoration project's long timeline, it is possible that continuing urban growth in Southern California will increase the economic and political pressure to transfer additional water from Imperial Valley to urban Southern California. The potential for such transfers is an issue that needs consideration before a specific restoration plan is adopted to ensure that future water inflows will be sufficient to support the plan's operation.

most part the benefits of protecting these natural resources are diffuse and benefit the public generally. This makes it difficult to obtain significant funding from potential individual beneficiaries.

While we recommend that the state work with the federal government and local interests to maximize the nonstate contribution to the restoration, for reasons discussed below we do not think it is likely that federal or local funds will be able to finance more than a small portion of the cost of the restoration.

Local Funding. While there are some potential sources of local funding for the restoration, we think these sources are relatively limited or uncertain.

- ***Local Water Districts.*** The statutes implementing the QSA capped the liability of the local water districts that are party to the QSA—including IID—to $133 million for environmental mitigation activities related to the water transfer. The IID is undertaking a habitat conservation plan to mitigate the impacts of the water transfer in the rivers, agricultural canals, and drains surrounding the southern end of the Sea. According to IID, the entire $133 million will be spent on developing and implementing this plan and to pay for the mitigation flows the IID is putting into the Sea, leaving none of these funds for future restoration activities. On the other hand, under the QSA statutes these water districts are required to pay $30 million into the Salton Sea Restoration Fund, which will be available for restoration efforts. Ultimately, the QSA statutes provides that—except for these two specified funding requirements—no further funding obligations are required of these local water districts.

- ***Other Local Governments.*** The QSA statutes and agreements limit contributions to the restoration from specified local water districts discussed above. On the other hand, the QSA statutes and agreements do not limit potential contributions to the restoration from other local governments, such as Imperial or Riverside Counties. Local governments adjacent to the Sea will benefit from any restoration of the Sea, to the extent that such as restoration leads to economic development in the area. However, because any such benefits will not accrue for decades, it is more practical to expect local governments to potentially share in the costs of operating and maintaining the restoration once it has been completed and the benefits begin to occur, rather than to contribute to the construction costs.

- ***Local Development Funding.*** The Salton Sea Authority has a proposal to fund its own proposed restoration plan using bonds sold against future property tax proceeds. Under this scenario, the federal government would transfer some unused federal lands along the west side of the Sea to the authority, which in turn would sell the land to a master developer. The authority would sell bonds to pay for the restoration. The bonds would be paid back, over many years, with future property assessments on the new development. The authority projects that

the plan could generate around $1 billion in bond proceeds. This proposal is fairly speculative in nature and it is uncertain whether such development financing can be counted upon to pay for a significant portion of the restoration. Setting up and running such a development scheme would most likely be a local responsibility. Because the state has the financial responsibility for the restoration, the Legislature should carefully consider whether such development financing can be a viable means to contribute to the restoration—for example, by helping to pay for the ongoing operations and maintenance costs of the restoration plan.

- ***Additional Water Transfer Proceeds.*** An important part of the QSA was the water transfer from IID to other Southern California water agencies. In addition to this primary water transfer, there are two other potential transfers that were envisioned in the QSA statutes—transfers involving the "(c)(1) water" and the "(c)(2) water." (See text box entitled "Water Transfers" on page 30.) These water transfers could only take place if they would advance the goals of the restoration. If they take place, the proceeds of these additional transfers—about $60 million for the (c)(1) water and an unknown amount for any remaining (c)(2) water—would be available solely for the restoration.

Federal Funding. Federal law requires the Bureau of Reclamation to develop a restoration plan for the Sea, with objectives similar to the state's objectives. Unlike the state, however, the federal government has no statutory or legal obligation to restore the Sea. It is in the state's interest to work with the federal government to secure a federal contribution to the restoration and we recommend the Legislature and the administration do so. (We note that the federal Water Resources Development Act of 2007 authorizes—but does not appropriate—$30 million in federal funds for the Salton Sea.)

However, we caution against counting on federal funding for a significant portion of the total project cost. Given the significant federal budget deficit and the federal government's existing financial commitments to the CALFED Bay-Delta Program and other environmental restoration projects, it seems unlikely that significant federal funding for a new environmental restoration project will be forthcoming. Even in cases where the federal government is under an obligation to share funding with the state, federal funding has not always been forthcoming. For example, while CALFED is ostensibly an equal partnership between the state, the federal government, and local water users, since 2000 the state has contributed over $2.6 billion to CALFED, mostly using general obligation bond funds, while the federal government has contributed less than $650 million.

State Funding. Ultimately, the state is likely to pay for the bulk of the restoration of the Sea. Potential state funding sources include:

- ***Existing Bond Funds***. While Proposition 50 provided $50 million for Colorado River projects, these funds have largely been spent on restoration planning and other activities. Proposition 84, which was approved by the voters in the November 2006 election, contains $47 million for the restoration of the Sea (for deposit in the Salton Sea Restora-

tion Fund). These bond funds can be used to carry out the intensive planning that will be necessary before the actual restoration project can be implemented. However, given the enormous projected costs of the restoration, these funds will make up only a small portion of the total project construction. (The *2007 Budget Act* provides $12.5 million from Proposition 50 and $13.3 million from Proposition 84 for restoration planning activities and other initial restoration activities.)

- ***General Fund.*** Because the state has the statutory responsibility for the restoration of the Sea, the state's General Fund will most likely be called upon to bear most of the costs of this restoration—either directly or as the funding source to retire additional bonds. There are statewide benefits to restoring the Sea—such as wildlife preservation or recreational opportunities—which justify the use of state funds. However, it is important to realize that the restoration will be com-

Water Transfers Under the Quantification Settlement Agreement

Imperial Irrigation District Water Transfer. At the heart of the Quantification Settlement Agreement (QSA) is a transfer of water from the Imperial Irrigation District (IID) to the San Diego County Water Authority, the Coachella Valley Water Authority, and/or the Metropolitan Water District of Southern California (Met). Under the QSA, IID will transfer water to one or more of these agencies for at least 35 years. The transferred amounts will ramp up from 10,000 acre-feet per year in 2003 to 300,000 acre-feet per year in 2026. Initially the water provided by IID will come from fallowing agricultural fields. Ultimately IID will rely on conservation measures to save enough water to meet the transfer obligations.

"(c) (2) Water" Transfer. As part of the QSA, IID will allow up to 800,000 total acre-feet of conserved water to flow into the Salton Sea until 2017 to mitigate impacts of the water transfer. After 2017, it was presumed that a restoration plan would mitigate other impacts of reduced flows into the Sea. This water is referred to as "mitigation flows" or (c) (2) water for its location in the Fish and Game Code (Section 2081.7[c] [2]). If the Secretary for Resources finds that mitigation flows are no longer necessary (for example because construction of a restoration plan is ready to begin), any remaining (c) (2) water can be transferred to Met for $250 per acre-foot (2003 dollars, adjusted for inflation).

"(c) (1) Water" Transfer. Under Fish and Game Code section 2081.7(c) (1), IID may transfer an additional 800,000 total acre-feet of water to the Department of Water Resources (DWR), for resale to Met. The DWR would pay IID $175 per acre-foot and Met would pay DWR $250 per acre-foot (2003 dollars, to be adjusted for inflation in both cases). In addition, DWR would be responsible for the mitigation of any impacts of this water transfer on the Sea.

According to statute, any net proceeds from either (c) (1) or (c) (2) water transfers would be deposited in the Salton Sea Restoration Fund and would be available for restoration activities.

peting with other funding priorities—such as education and health care—for future General Fund dollars.

Summary. Adopting and beginning the implementation of a restoration plan turns a general state liability to restore the Sea into a specific dollar obligation. Further, due to the integrated nature of the alternatives under consideration, adoption of any of the proposed alternatives will—in effect—commit the state to a significant, ongoing funding obligation. It is critical to realize that the benefits of the Preferred Alternative—or any of the alternatives—will generally accrue only when the entire project is completed. There would be little benefit to constructing one-half of a restoration plan.

As discussed, it seems most likely that the state's General Fund will be "on the hook" for the bulk of the costs for any restoration plan. Nevertheless, the state should aggressively pursue all options for nonstate funds as a means to partially finance the restoration effort.

Governing the Restoration Process

Existing law clearly declares the state's obligation to restore the Sea and sets up a process to develop a restoration plan. However, there is no statutory guidance as to the process for carrying out the restoration. In particular, there are no state or local agencies that have been given the responsibility for actually restoring the Sea. Whether the Legislature adopts a comprehensive restoration plan or instead initially adopts only interim measures for the near term, the Legislature should designate one or more implementing entities for the restoration. Such entities could be a single or multiple departments within state government; local agencies; a collaborative structure of several state, federal, and/or local agencies; or some other system. We discuss these options further below.

Desired Outcomes in Designing a Governance Structure. In designing a governance structure for the restoration, the desired outcomes are:

- ***Authority to Carry Out Program Goals.*** Given the considerable cost of the potential restoration alternatives and the very long timeline for full project implementation, it is critical that the implementing entities be able to effectively implement the restoration. Specifically, the implementing entities should be given sufficient authority over the project to make appropriate decisions and sufficient staff expertise to carry out the restoration.

- ***Accountability to the Administration, the Legislature, and the Public.*** Given that the restoration will consume considerable state funds, it is critical that elected officials and the public at large are able to hold the implementing entities accountable for both successes and failures of the restoration process. Accountability requires both transparency in decision making and the ability for elected officials to hold specific decision makers responsible for their actions. Essentially, accountability to the Legislature requires that the Legislature knows who is making decisions so that it can hold that person or persons directly accountable for the results of those decisions.

- ***Administrative Efficiency.*** Given the enormous projected costs of the restoration, it is essential that the state perform

the restoration as efficiently as possible. The Legislature can facilitate efficiency by adopting a program structure that does not include unnecessary complexity or duplication of effort, while facilitating coordination among multiple agencies. For example, the Legislature should avoid creating a program structure that relies on a diffuse decision making process, as this often leads to conflicting program goals and administrative redundancies.

These objectives will be important to the long-term success of the restoration project. Unfortunately, sometimes these objectives are at odds, and hence the Legislature will have to balance the competing needs when creating a governance structure. For example, oftentimes a single department is the most efficient body for performing a specified task. Departments have a clearly defined organizational structure with a single department head who is empowered to make direct management decisions and who can be held accountable for the department's performance by the Governor and the Legislature. On the other hand, departments do not always utilize the public deliberation and decision making processes that occur with an appointed or elected commission or board. However, regardless of the governance structure, public participation can always be built in as a design feature. For example, statute requires the Department of Toxic Substances Control to have public input into its regulatory decision making processes.

Options for a Governance Structure. In balancing the goals of effectiveness, accountability, and efficiency, there are several governance models that could be used to implement the restoration of the Sea. There are three primary models, with many variants for each:

- ***Direct State Control.*** Under this model, the state would take the lead in implementing the restoration. The Legislature could designate a single body—either existing or newly created—to carry out the restoration; it could assign the various restoration activities to different bodies of state government; or, it could designate a lead department or agency, and either allow that lead entity to divide up restoration activities amongst other state entities as needed or make this allocation itself. Under any of these scenarios, direct state control would centralize restoration activities, making it easier for the Legislature to oversee the restoration process. On the other hand, it may limit participation by local interests or other interested parties.

- ***Local Control.*** There is considerable interest in the communities surrounding the Sea for direct local control of the restoration process. In order to ensure that those people most directly impacted by conditions at the Sea are empowered to make decisions about its future, the state could designate a local body—such as the Salton Sea Authority—as the body to implement the restoration. While there is merit in giving local interests a role in the restoration process, it is the state—rather than local interests—that has the statutory responsibility to pay for and carry out the restoration. Therefore, focusing authority locally would separate those with authority from those with the primary responsibility for the restoration (including paying for it). This would make it difficult to hold decision makers accountable for their actions.

- ***The Collaborative Model.*** Under this structure, the various state agencies, as well as local interests, federal agencies, and nongovernmental groups, would be grouped together to form a collaborative structure. Such a governance model would maximize public access and allow all the interested groups a direct stake in the process. On the other hand, creating a diffuse governance structure without a clear leader would limit the ability of the state's elected officials to oversee the restoration, since there would be no single responsible entity that could be held to account for program successes and failures.

Recommended Governance Structure. There are inherent relative strengths and weaknesses in each of the governance models discussed above. Given the very significant financial responsibility faced by the state, we believe that a necessary characteristic of any governance structure is that it will be accountable to the Governor and the Legislature. Therefore, we recommend that the Legislature adopt a model of direct state control, as this provides the greatest accountability to the state's elected officials.

While the Secretary for Resources was responsible for developing and recommending the Preferred Alternative, we believe that the Secretary lacks the staff, administrative capacity, and the day-to-day program expertise (found in the agency's constituent departments) to *directly* implement such a considerable project. Therefore, we recommend the Legislature designate the Department of Water Resources as the lead entity responsible for implementing the restoration. Since the department is headed by a director who is directly responsible to the Governor and who can be held accountable by the Legislature, designating the department as the lead entity for the restoration will further accountability. In addition, the technical and organizational expertise required to manage the complex State Water Project (built up over several decades) will be a very valuable asset to the department in planning, constructing, and operating the restoration plan. However, restoration of the Sea will touch on issues relating to fish and wildlife, air quality, land acquisition, and many other technical issues—many of which are outside the department's primary area of responsibility. Therefore, it will be essential that the department work closely with other, relevant state entities, such as Department of Fish and Game, the Air Resources Board and the Wildlife Conservation Board, to name a few. We believe that where appropriate, the department should consult with and contract with these other entities for specialized assistance, while retaining primary responsibility for overseeing the restoration. In adopting implementing legislation for the governance structure, the Legislature should address the roles of other state or local agencies, so that the various roles are clear from the outset.

While we believe that it is in the state's best interest to designate a single body with direct project oversight responsibility, we think that there is value in providing a mechanism for other state, federal, and local agencies and interest groups to provide input and feedback to the department. In order to facilitate continued public involvement and deliberation, we recommend that the Legislature extend the term of the existing Advisory Committee. This would allow for continuing public deliberation and public input

to the department. We recommend that the Advisory Committee continue to be *advisory* in nature while the department be directly *responsible* for the restoration. While a more diffuse and collaborative organizational structure may provide a greater level of input from interested parties, the Director of the Department Water of Resources answers to the Governor and the Legislature, who together are accountable to *all* the residents of the state and bear ultimate responsibility for the restoration of the Sea.

Legislature Should Adopt A Restoration Plan

Once the Legislature has clearly declared its priorities for the restoration, and decided how it will be paid for and governed, the Legislature is in a position to adopt a specific restoration plan in statute. Due to the potentially unprecedented scope and cost of the restoration effort, we believe it is critical that the Legislature formally adopt a specific restoration plan. Formally adopting a restoration plan in statute will allow future Legislatures and the public to measure the progress in restoring the Sea against the official plan.

Adopting Interim Measures Prior to the Final Plan

Should the Legislature decide not to adopt and proceed with an integrated, long-term restoration plan in the near future, we recommend that the Legislature consider adopting interim measures to mitigate some of the most pressing impacts of the water transfer in the near term. Adopting interim measures can address key impacts of the water transfer, while allowing more time to determine how the state will proceed with the overall long-term restoration effort. Should the Legislature decide not to proceed with a full scale restoration in the near term, we recommend the Legislature specifically adopt interim measures to mitigate the immediate air quality impacts and habitat loss. For example, all of the alternatives under consideration include "early start habitat" which could provide bird habitat during the period between the initial decline in inflows and the completion of the restoration project. Funding early start habitat can protect species of concern in the near term and in most cases involve "no regrets" actions that could be incorporated into any final plan for a comprehensive restoration project.

In this vein, the Legislature has already provided $26 million in the *2007 Budget Act* to the Department of Fish and Game that can be used for project planning and early start habitat, thereby allowing for timely, early actions to make habitat improvements that are not contingent on the final restoration plan.

CONCLUSION

In previous decades, the Sea provided both wildlife habitat and recreational opportunities. Due to the QSA water transfer, the Sea will become increasingly saline and the shoreline will recede over the next few decades—causing significant impacts to air quality, wildlife, and water quality. The state has a statutory and contractual obligation to restore the Sea. In addition, there are policy reasons for the state to restore the Sea. While there may be opportunities for some financial participation by local interests or the federal government, the state is likely to pay the bulk of the cost of restoring the Sea—$8.9 billion under the current proposal. As it considers the restoration of the Sea, we recommend several actions that the Legislature should take, such as setting priorities, planning for how to finance the restoration, creating a governance structure for the restoration, adopting a formal restoration plan, and potentially adopting interim measures to mitigate near-term impacts. We summarize our recommendations in Figure 7.

Figure 7

Restoring the Salton Sea
LAO Recommendations

Setting Priorities

Place greatest priority on mitigating air quality impacts of the Quantification Settlement Agreement water transfer, followed by mitigating wildlife habitat loss.

Adopting a Comprehensive Plan for the Restoration

Deciding How to Pay for the Restoration

- Work with local and federal partners to secure nonstate funding.
- Include a comprehensive and realistic funding plan.

Governing the Restoration Process

- Designate the Department of Water Resources as the lead entity for implementing the restoration.
- Extend the term of the Advisory Committee to provide public input into the process.

Adopting Restoration Plan in Statute

Adopt in statute the Legislature's choice of a restoration plan, based on legislatively determined expenditure priorities for the restoration.

Adopting Interim Measures Prior to the Final Plan

Consider adopting measures to address priority impacts while consideration of the long-term restoration plan is ongoing.